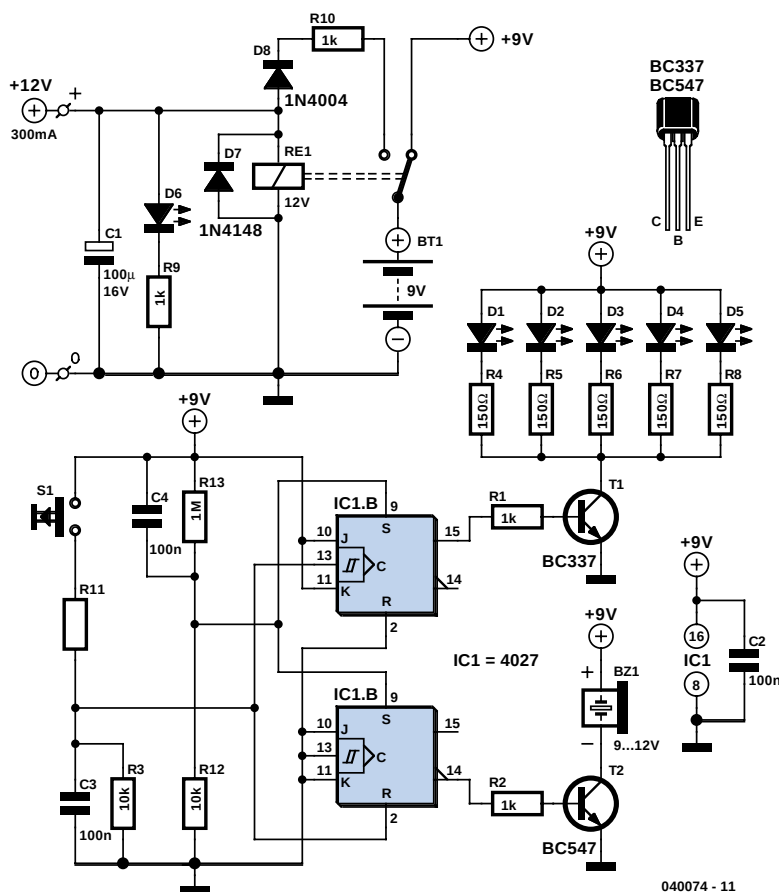


Mains Voltage Monitor



Goswin Visschers

Many electronics hobbyists will have experienced the following: you try to finish a project late at night, and the mains supply fails. Whether that is caused by the electricity board or your carelessness isn't really important. In any case, at such times you may find yourself without a torch or with flat batteries. There is no need to panic, as this circuit provides an emergency light.

When the mains fails, the mains voltage monitor turns on five super bright LEDs, which are fed from a 9 V battery (NiCd or NiMH) or 7 AA cells. A buzzer has also been included, which should wake you from your sleep when the mains fails. You obviously wouldn't want to oversleep because your clock radio had reset, would you?

When the mains voltage is present, the battery is charged via relay RE1, diode D8 and resistor R10. D8 prevents the battery voltage from powering the relay, and

makes sure that the relay switches off when the mains voltage disappears. R10 is chosen such that the charging current of the battery is only a few milliamps. This current is small enough to prevent overcharging the battery. D6 acts as a mains indicator.

When the relay turns off, IC1 receives power from the battery. The JK flip-flops are set via R12 and C4. This causes T1 and T2 to conduct, which turns on D1-D5 and the buzzer.

When the push button is pressed, a clock pulse appears on the CLK input of flip-flop IC1b. The output then toggles and the LEDs turn off. At the same time IC1a is reset, which silences the buzzer. If you press the button again, the LEDs will turn on since IC1b receives another clock pulse. The buzzer remains off because IC1a stays in its reset state. R11, R3 and C3 help to debounce the push button signal. In this way the circuit can also be used as a torch, especially if a separate mains adapter is used as the power supply.

As soon as the mains voltage is restored, the relay turns on, the LEDs turn off and the battery starts charging. The function of R13 is to discharge C4, preparing the circuit for the next mishap. If mains failures are a regular occurrence, we recommend that you connect pairs of LEDs in series. The series resistors should then have a value of 100 Ω . This reduces the current consumption and therefore extends the battery life. This proves very useful when the battery hasn't recharged fully after the last time.

In any case, you should buy the brightest LEDs you can get hold of. If the LEDs you use have a maximum current of 20 mA, you should double the value of the series resistors! You could also consider using white LEDs.

(040074-1)